ABSTRACT

Purpose: The purpose of this study was to analyse the interface formed by pre-machined Co-Cr implant abutment bases with Co-Cr cast on alloy before and after simulated porcelain firing.

Materials and Methods: Twenty customized screw retained abutments were fabricated using compound casting technique using a pre-machined Co-Cr implant abutment base and Co-Cr casting alloy. Ten as cast abutments (Group I) and ten cast abutments subjected to simulated porcelain firing (Group II) were embedded in clear autopolymerising acrylic resin blocks. These blocks were vertically sectioned using a water jet powered sectioning equipment. The microstructures and the elemental compositions of the implant abutment base, cast alloy and their interface were investigated by scanning electron microscopy and energy dispersive spectroscopy. The Vickers hardness at these three regions were determined for both groups. Statistical comparisons of the mechanical properties were made using one-way ANOVA, post hoc tukey HSD and Non parametric independent t test.

Results: Microstructure of cast on abutments before and after simulated porcelain firing revealed a continuous, non-porous interface without formation of any new metallic phases. EDS of abutments of both the groups showed diffusion of Nb and Ga in both directions across the interface to a distance of 4.5µm. The mean hardness values at the implant abutment base, cast alloy and their interface were found to be found to be 392.66 HV, 441.09 HV and 426.52 HV for Group I and 349.41 HV, 418.93 HV and 376.88 HV for Group II respectively. Non-parametric independent t test revealed that the hardness values at all the three regions were significantly reduced after simulated porcelain firing

Conclusion: Within the limitations of the study, it can be concluded that the Co-Cr premachined abutment base has metallurgical compatibility with Co-Cr casting alloy.

Key words: Cast on abutment, compound casting, metallurgical compatibility, Scanning electron microscope (SEM), Energy dispersive spectroscopy (EDS), Vickers hardness.